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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>B60J 5/04</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 99/59833</b></p> <p>(43) International Publication Date: 25 November 1999 (25.11.99)</p>
<p>(21) International Application Number: PCT/US99/10774</p> <p>(22) International Filing Date: 14 May 1999 (14.05.99)</p> <p>(30) Priority Data: 298 08 833.9      15 May 1998 (15.05.98)      DE</p> <p>(71) Applicant: DELPHI TECHNOLOGIES, INC. [US/US]; P.O. Box 5052, Troy, MI 48007 (US).</p> <p>(72) Inventors: DANCASIUS, Michael; Klotzbahn 8, D-42105 Wuppertal (DE). MANUEL, Mark; 14377 Knightsbridge, Shelby Township, Macomb County, MI 48315 (US). STEUPERT, Juergen, P.; 8249 Caribou Trail, Clarkston, MI 48348 (US). SEIBERT, Jens; Berghauser Strasse 14, D-42349 Wuppertal (DE).</p> <p>(74) Agent: MARRA, Kathryn, A.; Delphi Technologies, Inc., Legal Staff, P.O. Box 5052, Troy, MI 48007 (US).</p>		<p>(81) Designated States: JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: MODULE FOR A VEHICLE DOOR</p> <div data-bbox="611 1542 1638 2341"> </div> <p>(57) Abstract</p> <p>A door module for a door of a motor vehicle includes a support panel (18) of molded plastic material; a structural member (20) of metallic material which is secured to the support panel; and a window regulator (12) having a cable (16). The window regulator is secured to the support panel or the structural member. The support panel has at least one cable guide channel (22) integrally molded therein for guiding a cable of a window regulator. This arrangement provides easier installation of door components, increased rigidity and strength for the door, and possible reduction in the number of components for the window regulator.</p>		

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DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## MODULE FOR A VEHICLE DOOR

### Technical Field

The present invention relates to a door module for a door of a motor vehicle, and in particular to a door module for use with a window regulator having a cable.

### Background of the Invention

It is usual practice for an inner door panel for a door of a motor vehicle to be formed with a large single aperture. Such an aperture is required in order to install the window regulator and other door components in the door, especially a window regulator which uses a cable for the raising and lowering of a window in the door. Such a large aperture reduces the rigidity and strength of the door. Also, installation of the window regulator in the door (especially on a vehicle production line) is difficult.

### Summary of the Invention

It is an object of the present invention to overcome the above mentioned disadvantages.

A door module in accordance with the present invention for a door of a motor vehicle comprises a support panel of molded plastic material; a structural member of metallic material which is secured to the support panel; and a window regulator having a cable. The window regulator is secured to the support panel and/or the structural member. The support panel has at least one cable guide channel integrally molded therein for guiding a cable of a window regulator.

The door module is positionable across the aperture in an inner panel of the door to provide rigidity and strength for the door. Components can be mounted on the door module prior to positioning of the door module in the door, making installation of the components easier. Additionally, by parts

integration, the present invention allows for a reduction in the number of components of a cable operated window regulator.

### Brief Description of the Drawings

5                   The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded view of a door module in accordance with the present invention with a window regulator;

10                   Figure 2 is a side view of an alternative support panel for a door module in accordance with the present invention; and

Figure 3 is a cross-sectional view on the line III-III of Figure 2.

### Description of the Preferred Embodiment

15                   Referring to Figure 1, the door module 10 is for positioning across an aperture in an inner panel (not shown) of a door (not shown) of a motor vehicle. The door has a window (not shown) which is capable of being raised or lowered by a window regulator 12 having a pair of guide rails 14 and a cable 16. The door module 10 comprises a support panel 18 and a structural member 20. The support panel 18 is molded from plastic material.

20                   The structural member 20 is formed from metallic material, such as steel, aluminium, or magnesium. The guide rails 14 for the window regulator 12 may be secured to the support panel 18 and/or the structural member 20, and may be positioned between the support panel and the structural member.

25                   The support panel 18 is molded to form guide channels 22 for the cable 16 of the window regulator 12, and, optionally, a drum housing 24 for the cable drum 26 of the window regulator; a support member 28 for an internal door handle (not shown); attachment pegs 30 for an internal arm rest (not shown); a speaker support 32 in which a speaker (not shown) may be mounted; routing channels (not shown) for electrical wiring or cable

30                   harnesses; fastening devices for electric wiring or cable harnesses; and housings (not shown) for other components, such as an electronic control

modules. The support panel 18 may be formed with the speaker support 32 covered by a removable portion 34 which is only removed when required for the mounting of the speaker. Other removable portions may be provided as required. The speaker support 32 may be molded at the required angle for the speaker when mounted in the door. The support panel 18 may form part of, or the whole of, an internal trim for the door. The guide rails 14 for the window regulator 12 can be secured to the support panel 18 in any suitable manner, or may be molded in place during the molding of the support panel. Alternatively, the guide rails may also be integrally molded with the support panel 18. Where the window regulator 12 includes an electric motor drive, the electric motor can be mounted on the support panel 18.

The structural member 20 may be an integral part of the inner panel (not shown) of the door, or may be a separately formed member which extends beyond the support panel to be bolted or welded to the inner panel. In the latter case, the structural member 20 may be secured to the support panel 18 by adhesive, screws, or any other suitable manner. Alternatively, the support panel 18 may be molded around or with the structural member 20. Where the window regulator 12 includes an electric motor drive, the electric motor can be mounted on the structural member 20.

The use of the support panel 18 allows some or all of the door components to be assembled on the panel before installation in the door, which allows easier assembly. The structural member 20 provides rigidity and reinforcement for the door. The use of the support panel 18 to provide cable guides 22 and, optionally, a drum housing 24 and/or guide rails 14 reduces the number of components for the window regulator 12.

The alternative support panel 18' shown in Figures 2 and 3 is molded from plastic material to form cable guide channels 22 and a drum housing 24 for the cable drum 26. The guide rails 14 of the window regulator are secured to the support panel 18' as shown in dashed outline. A channel 36 may be formed in the support panel 18' adjacent the peripheral edge 38 of the support panel to provide a seal with the inner panel of the door.

Claims

1. A door module for a door of a motor vehicle comprising:  
a support panel (18);  
a structural member (20) which is secured to the support panel;  
and a window regulator (12) having a cable (16); and  
5 at least one cable guide channel (22) integrally molded into the support panel for guiding the cable of the window regulator.
2. A door module as claimed in Claim 1, wherein the support panel (18) is molded from a plastic material and wherein the structural member (20) is made of a metallic material
3. A door module as claimed in Claim 1, wherein the window regulator is secured to one of the support panel and the structural member.
4. A door module as claimed in Claim 1, wherein the window regulator (12) includes a cable drum (26) and wherein the support panel (18) has a cable drum housing (24) integrally molded therein for the cable drum of the window regulator.
5. A door module as claimed in Claim 1, wherein the window regulator (12) includes guide rails (14), and wherein the guide rails are integrally molded in the support panel (18).
6. A door module as claimed in Claim 1, wherein the window regulator (12) has guide rails (14), and wherein the guide rails



are secured to at least one of the structural member (20) and the support panel (18).

7. A door module as claimed in Claim 1, wherein the support panel (18) includes a speaker support (32) integrally molded therein.

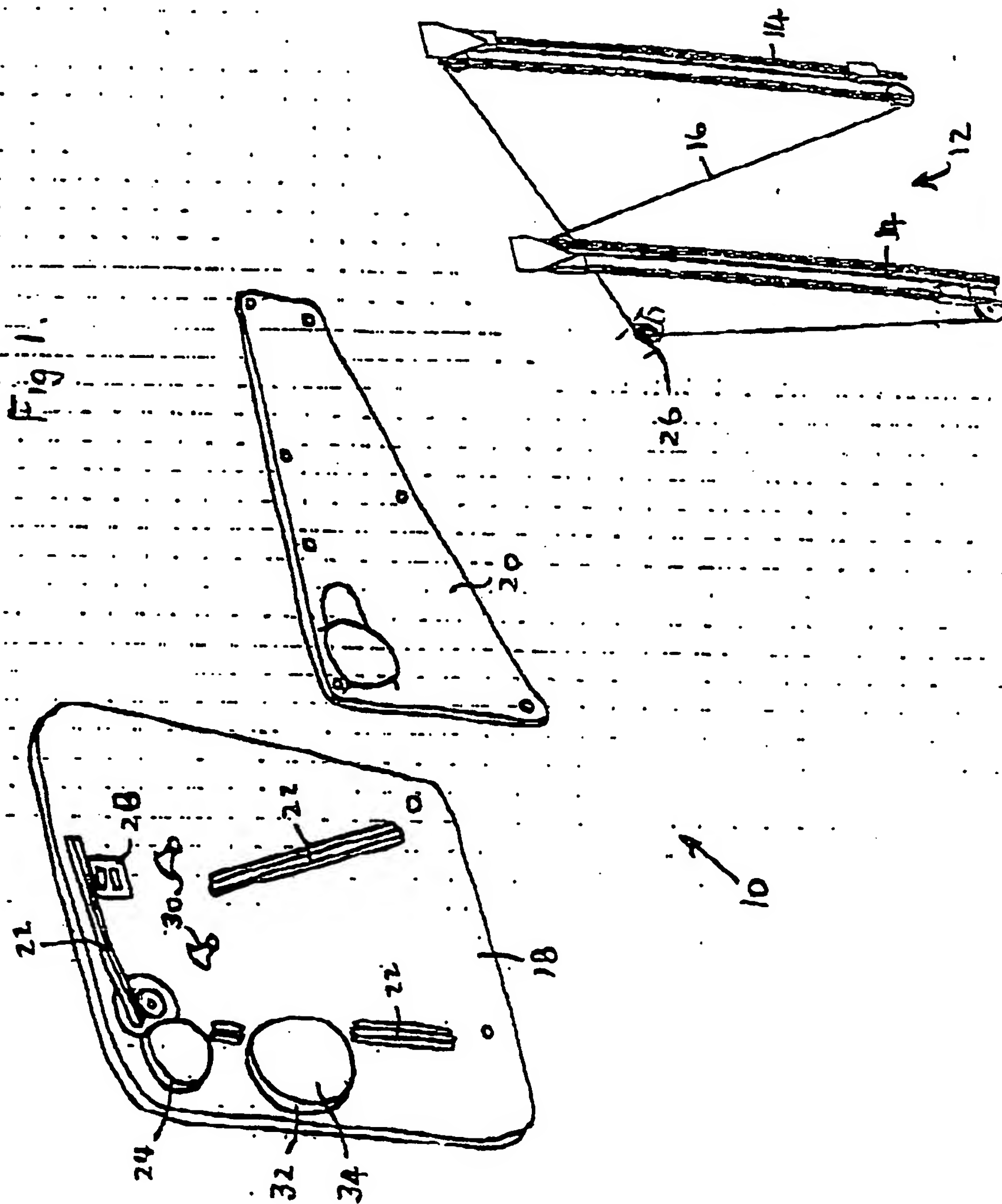
8. A door module as claimed in Claim 1, wherein the door includes an inner panel and wherein structural member (20) is an integral portion of the inner panel of the door.

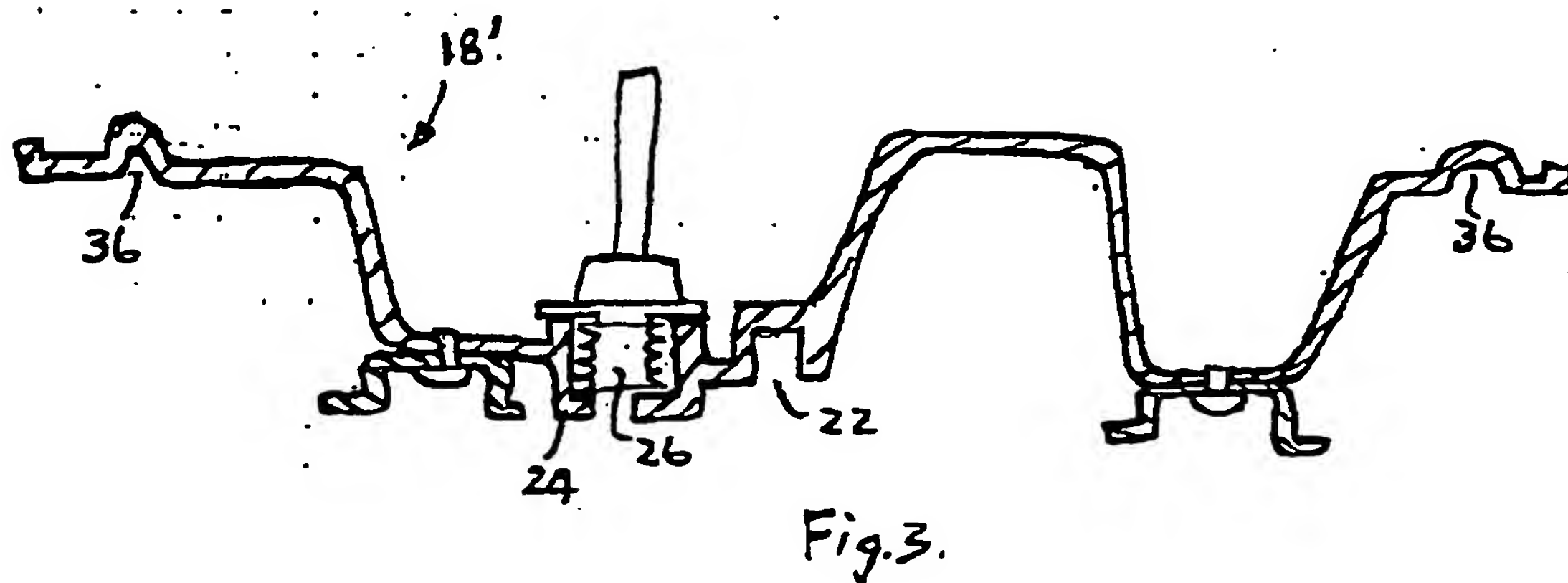
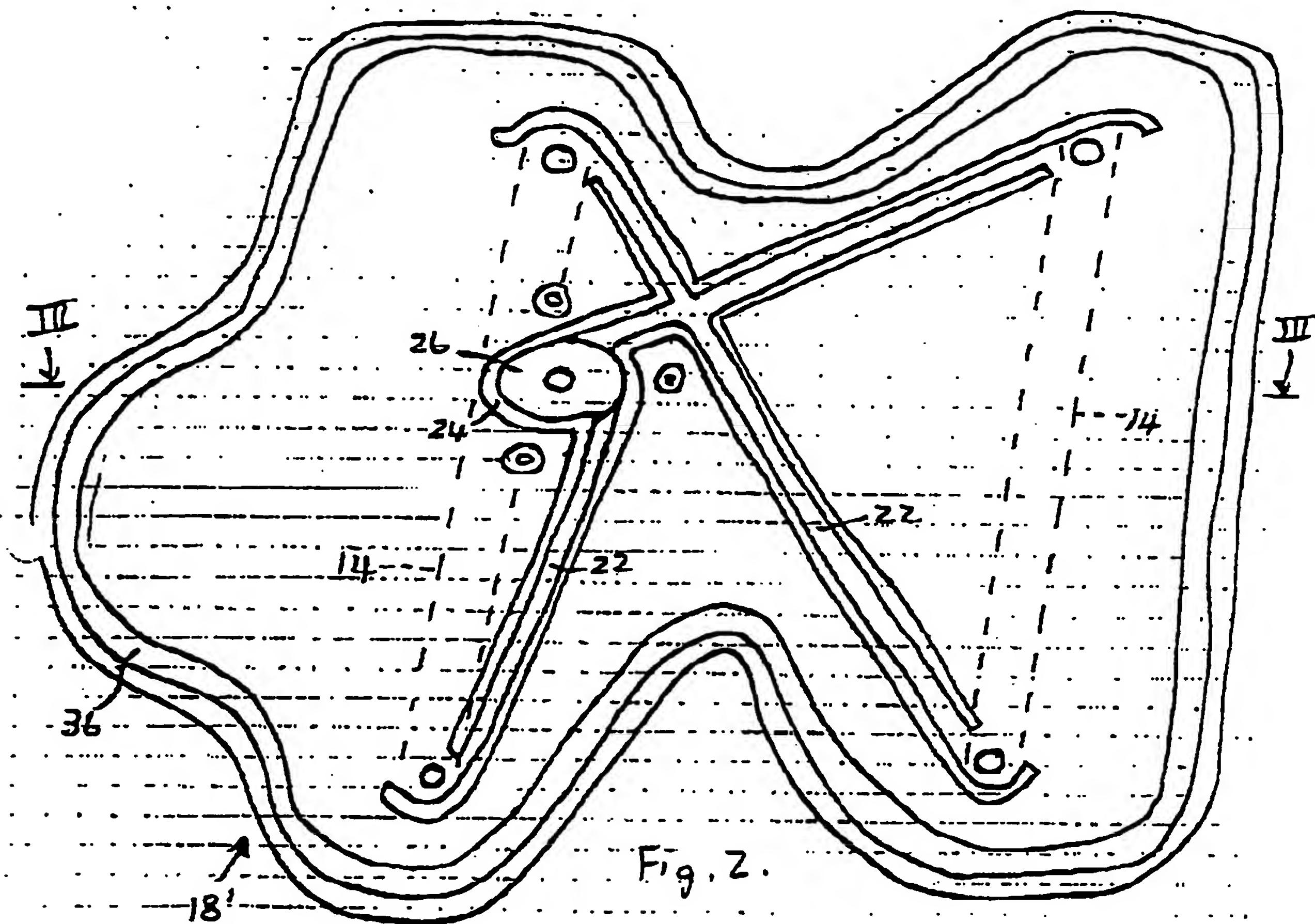
9. A door module as claimed in Claim 1, wherein the support panel (18) is molded to the structural member (20).

10. A door module as claimed in Claim 1, wherein the door includes a trim panel and wherein the support panel defines at least part of the trim panel.

11. A door module as claimed in Claim 1, wherein an electric motor is mounted on one of the support panel and the structural member.

12. A door module as claimed in Claim 1, wherein a door latch is mounted on one of the support panel and the structural member.





## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/10774

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B60J 5/04

US CL : 296/146.6

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 296/146.1, 146.5, 146.6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,548,930 A (Morando) 27 Aug 1996 (27/8/96) see entire document.	1-12
X	US 5,505,024 A (DeRees et al.) 9 Apr 1996 (9/4/96) see entire document.	1-6, 8-10, 12
Y	US 5,584,144 A (Hisano) 17 Dec 1996 (17/12/96) see entire document.	1-3,7,8,10- 12
A	US 5,308,138 A (Hlavatey) 3 May 1994 (3/5/94) see entire document.	1



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

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Date of mailing of the international search report

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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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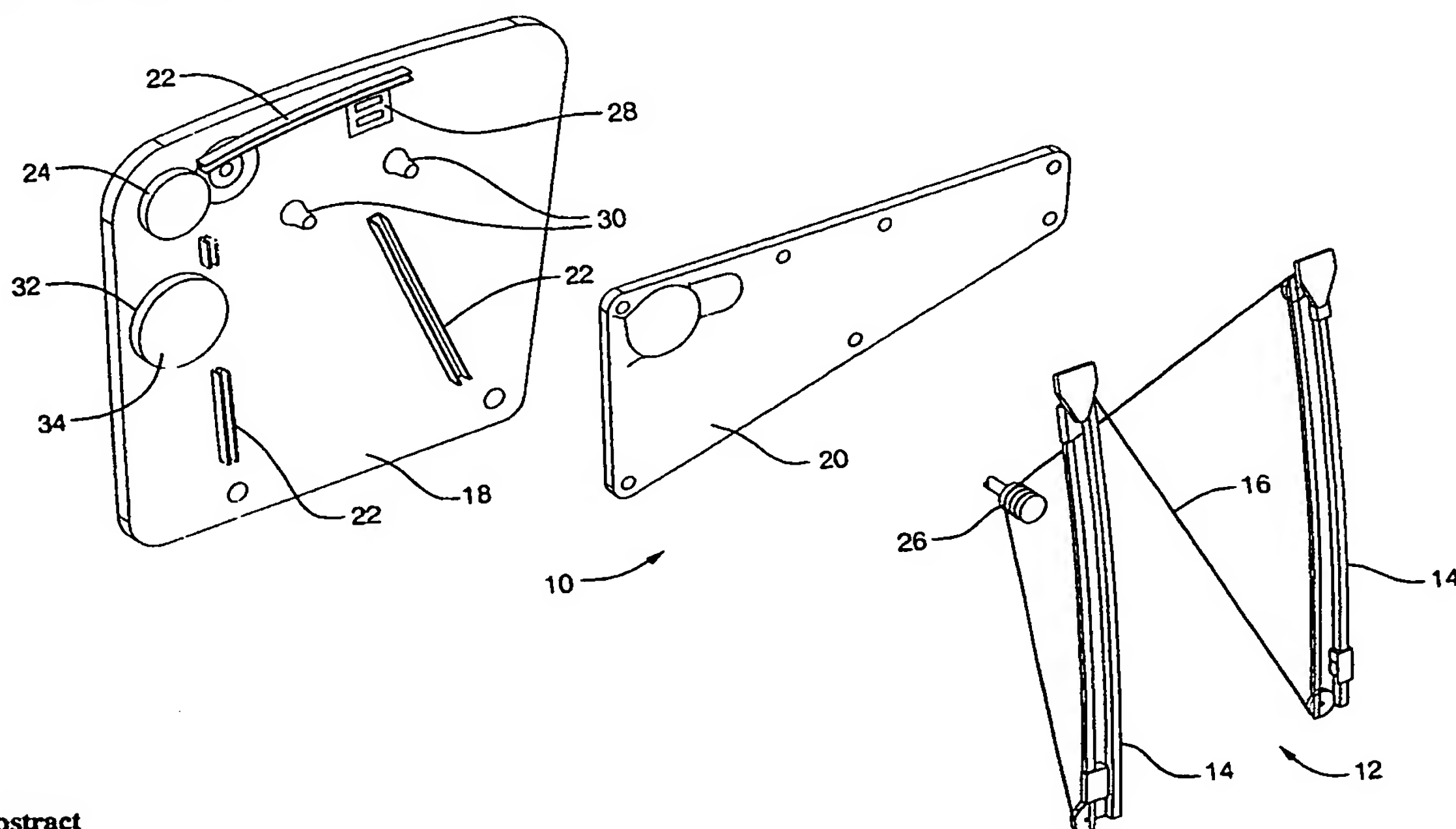
(22) International Filing Date: 14 May 1999 (14.05.99)

(30) Priority Data:  
298 08 833.9 15 May 1998 (15.05.98) DE(71) Applicant: DELPHI TECHNOLOGIES, INC. [US/US]; P.O.  
Box 5052, Troy, MI 48007 (US).(72) Inventors: DANCASIUS, Michael; Klotzbahn 8, D-42105  
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Shelby Township, Macomb County, MI 48315 (US). STEU-  
PERT, Juergen, P.; 8249 Caribou Trail, Clarkston, MI 48348  
(US). SEIBERT, Jens; Berghauser Strasse 14, D-42349  
Wuppertal (DE).(74) Agent: MARRA, Kathryn, A.; Delphi Technologies, Inc., Legal  
Staff, P.O. Box 5052, Troy, MI 48007 (US).(81) Designated States: JP, KR, European patent (AT, BE, CH, CY,  
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SE).

## Published

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claims and to be republished in the event of the receipt of  
amendments.*

(54) Title: MODULE FOR A VEHICLE DOOR



## (57) Abstract

A door module for a door of a motor vehicle includes a support panel (18) of molded plastic material; a structural member (20) of metallic material which is secured to the support panel; and a window regulator (12) having a cable (16). The window regulator is secured to the support panel or the structural member. The support panel has at least one cable guide channel (22) integrally molded therein for guiding a cable of a window regulator. This arrangement provides easier installation of door components, increased rigidity and strength for the door, and possible reduction in the number of components for the window regulator.

\*(Referred to in PCT Gazette No. 5/2000, Section II)

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## MODULE FOR A VEHICLE DOOR

### Technical Field

The present invention relates to a door module for a door of a motor vehicle, and in particular to a door module for use with a window regulator having a cable.

### Background of the Invention

It is usual practice for an inner door panel for a door of a motor vehicle to be formed with a large single aperture. Such an aperture is required in order to install the window regulator and other door components in the door, especially a window regulator which uses a cable for the raising and lowering of a window in the door. Such a large aperture reduces the rigidity and strength of the door. Also, installation of the window regulator in the door (especially on a vehicle production line) is difficult.

### Summary of the Invention

It is an object of the present invention to overcome the above mentioned disadvantages.

A door module in accordance with the present invention for a door of a motor vehicle comprises a support panel of molded plastic material; a structural member of metallic material which is secured to the support panel; and a window regulator having a cable. The window regulator is secured to the support panel and/or the structural member. The support panel has at least one cable guide channel integrally molded therein for guiding a cable of a window regulator.

The door module is positionable across the aperture in an inner panel of the door to provide rigidity and strength for the door. Components can be mounted on the door module prior to positioning of the door module in the door, making installation of the components easier. Additionally, by parts



integration, the present invention allows for a reduction in the number of components of a cable operated window regulator.

#### Brief Description of the Drawings

5                   The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded view of a door module in accordance with the present invention with a window regulator;

10                   Figure 2 is a side view of an alternative support panel for a door module in accordance with the present invention; and

Figure 3 is a cross-sectional view on the line III-III of Figure 2.

#### Description of the Preferred Embodiment

15                   Referring to Figure 1, the door module 10 is for positioning across an aperture in an inner panel (not shown) of a door (not shown) of a motor vehicle. The door has a window (not shown) which is capable of being raised or lowered by a window regulator 12 having a pair of guide rails 14 and a cable 16. The door module 10 comprises a support panel 18 and a structural member 20. The support panel 18 is molded from plastic material.

20                   The structural member 20 is formed from metallic material, such as steel, aluminium, or magnesium. The guide rails 14 for the window regulator 12 may be secured to the support panel 18 and/or the structural member 20, and may be positioned between the support panel and the structural member.

25                   The support panel 18 is molded to form guide channels 22 for the cable 16 of the window regulator 12, and, optionally, a drum housing 24 for the cable drum 26 of the window regulator; a support member 28 for an internal door handle (not shown); attachment pegs 30 for an internal arm rest (not shown); a speaker support 32 in which a speaker (not shown) may be mounted; routing channels (not shown) for electrical wiring or cable

30                   harnesses; fastening devices for electric wiring or cable harnesses; and housings (not shown) for other components, such as an electronic control



modules. The support panel 18 may be formed with the speaker support 32 covered by a removable portion 34 which is only removed when required for the mounting of the speaker. Other removable portions may be provided as required. The speaker support 32 may be molded at the required angle for the speaker when mounted in the door. The support panel 18 may form part of, or the whole of, an internal trim for the door. The guide rails 14 for the window regulator 12 can be secured to the support panel 18 in any suitable manner, or may be molded in place during the molding of the support panel. Alternatively, the guide rails may also be integrally molded with the support panel 18. Where the window regulator 12 includes an electric motor drive, the electric motor can be mounted on the support panel 18.

The structural member 20 may be an integral part of the inner panel (not shown) of the door, or may be a separately formed member which extends beyond the support panel to be bolted or welded to the inner panel. In the latter case, the structural member 20 may be secured to the support panel 18 by adhesive, screws, or any other suitable manner. Alternatively, the support panel 18 may be molded around or with the structural member 20. Where the window regulator 12 includes an electric motor drive, the electric motor can be mounted on the structural member 20.

The use of the support panel 18 allows some or all of the door components to be assembled on the panel before installation in the door, which allows easier assembly. The structural member 20 provides rigidity and reinforcement for the door. The use of the support panel 18 to provide cable guides 22 and, optionally, a drum housing 24 and/or guide rails 14 reduces the number of components for the window regulator 12.

The alternative support panel 18' shown in Figures 2 and 3 is molded from plastic material to form cable guide channels 22 and a drum housing 24 for the cable drum 26. The guide rails 14 of the window regulator are secured to the support panel 18' as shown in dashed outline. A channel 36 may be formed in the support panel 18' adjacent the peripheral edge 38 of the support panel to provide a seal with the inner panel of the door.

Claims

1. A door module for a door of a motor vehicle comprising:  
a support panel (18);  
a structural member (20) which is secured to the support panel;  
and a window regulator (12) having a cable (16); and  
5 at least one cable guide channel (22) integrally molded into the support panel for guiding the cable of the window regulator.
2. A door module as claimed in Claim 1, wherein the support panel (18) is molded from a plastic material and wherein the structural member (20) is made of a metallic material
3. A door module as claimed in Claim 1, wherein the window regulator is secured to one of the support panel and the structural member.
4. A door module as claimed in Claim 1, wherein the window regulator (12) includes a cable drum (26) and wherein the support panel (18) has a cable drum housing (24) integrally molded therein for the cable drum of the window regulator.
5. A door module as claimed in Claim 1, wherein the window regulator (12) includes guide rails (14) , and wherein the guide rails are integrally molded in the support panel (18).
6. A door module as claimed in Claim 1, wherein the window regulator (12) has guide rails (14), and wherein the guide rails

are secured to at least one of the structural member (20) and the support panel (18).

7. A door module as claimed in Claim 1, wherein the support panel (18) includes a speaker support (32) integrally molded therein.

8. A door module as claimed in Claim 1, wherein the door includes an inner panel and wherein structural member (20) is an integral portion of the inner panel of the door.

9. A door module as claimed in Claim 1, wherein the support panel (18) is molded to the structural member (20).

10. A door module as claimed in Claim 1, wherein the door includes a trim panel and wherein the support panel defines at least part of the trim panel.

11. A door module as claimed in Claim 1, wherein an electric motor is mounted on one of the support panel and the structural member.

12. A door module as claimed in Claim 1, wherein a door latch is mounted on one of the support panel and the structural member.

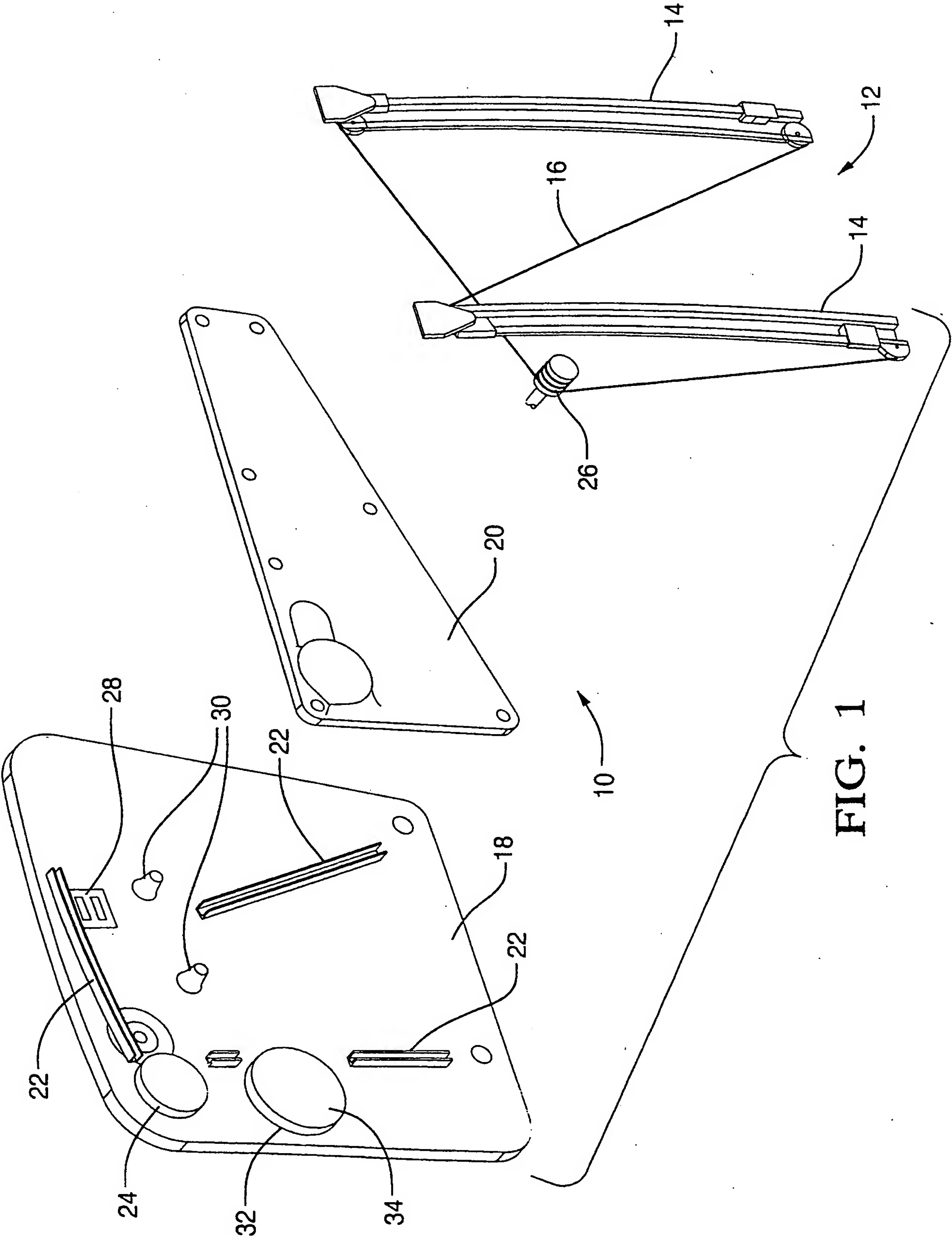


FIG. 1

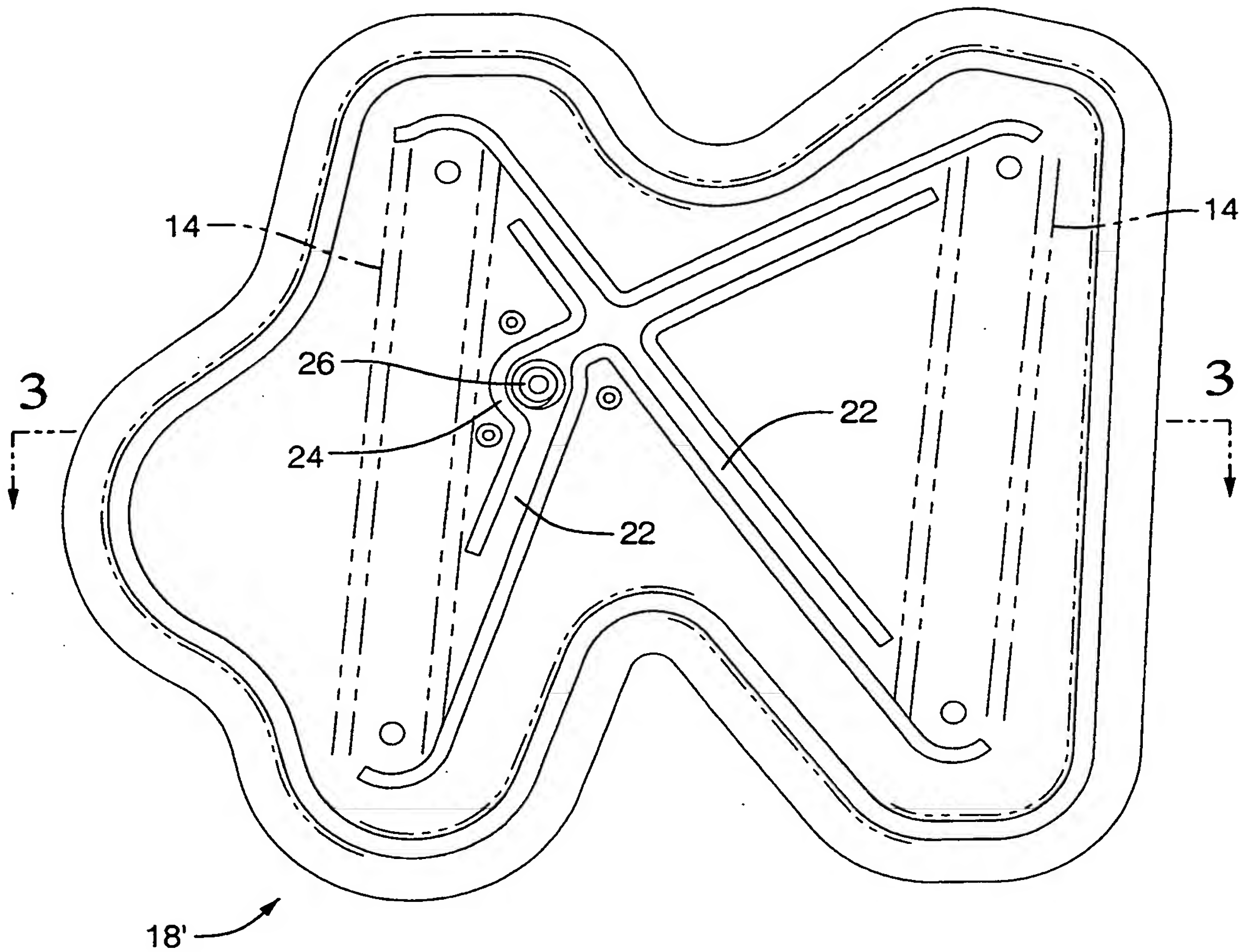


FIG. 2

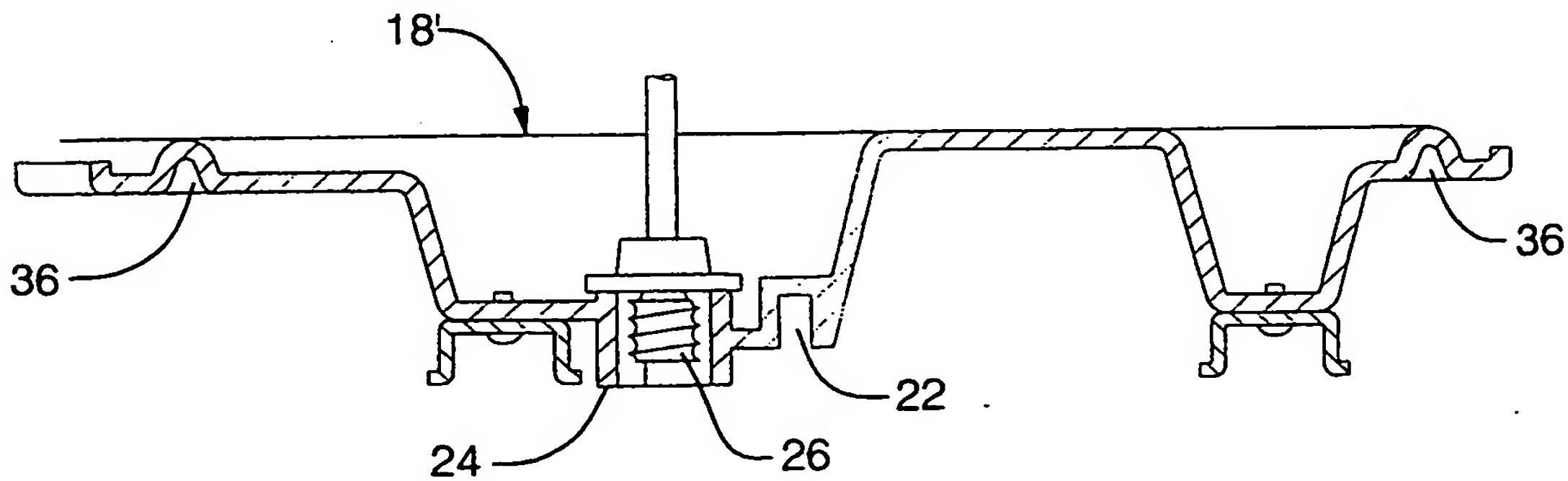


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/10774

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :B60J 5/04

US CL : 296/146.6

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 296/146.1, 146.5, 146.6

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	US 5,584,144 A (Hisano) 17 Dec 1996 (17/12/96) see entire document.	1-3,7,8,10- 12
A	US 5,308,138 A (Hlavatey) 3 May 1994 (3/5/94) see entire document.	1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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